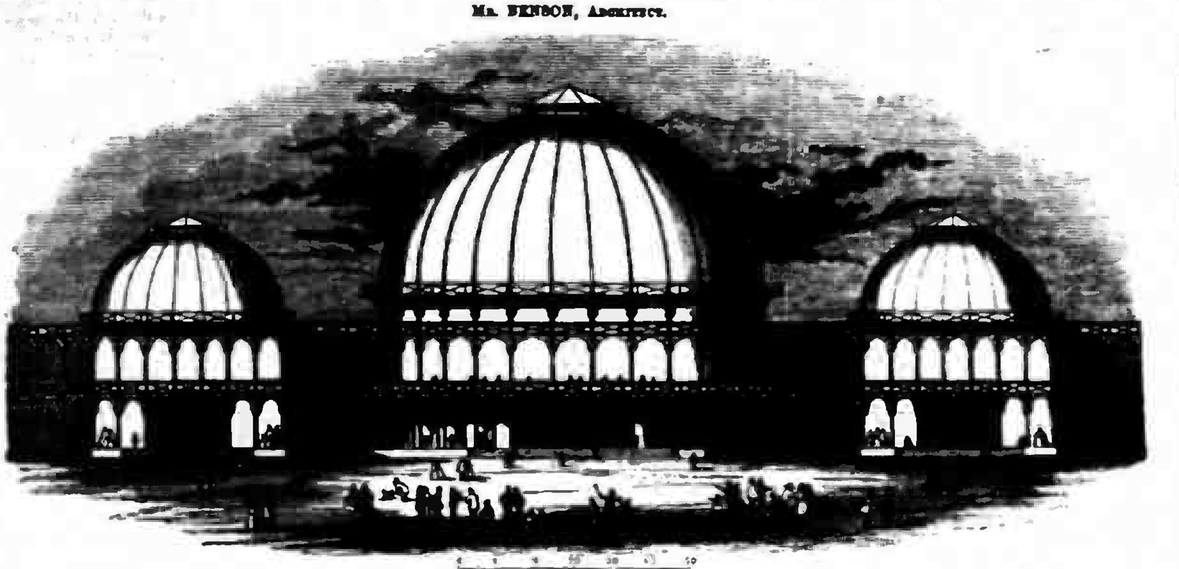
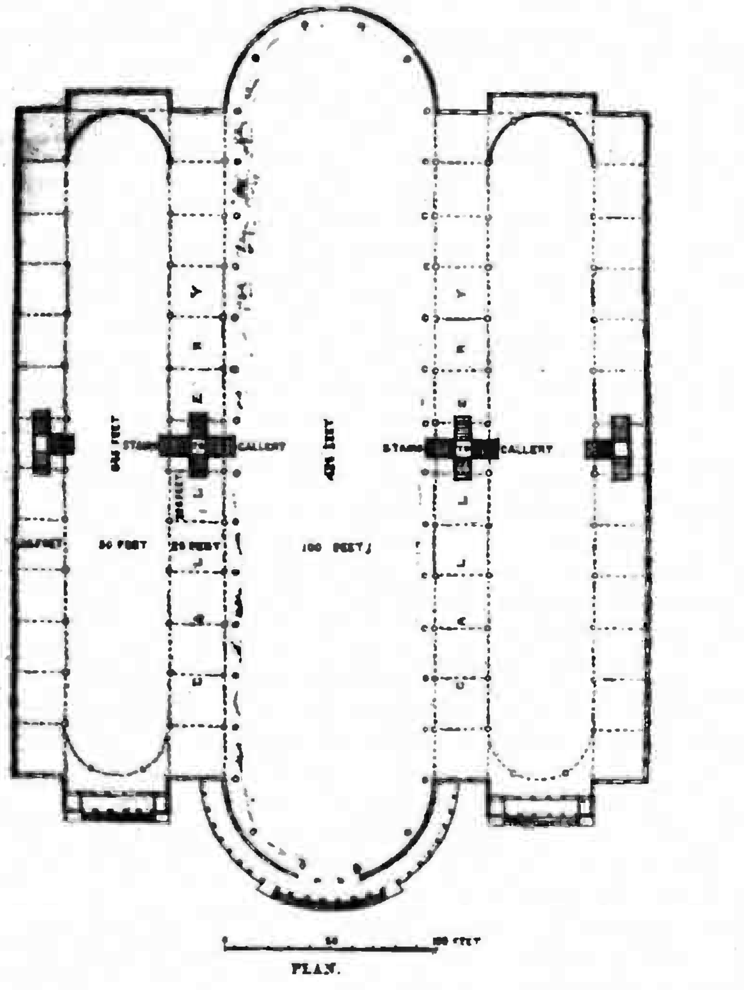
BUILDING FOR THE INDUSTRIAL EXHIBITION, 1853, DUBLIN.*

MR. BENSON, ARCHITECT.





PLAN.

polish, if possible, to lessen friction and disturbance of the currents.

3. Drains must not be too large; neither must the entrances to air-outlets—though for a different reason, viz. that the currents collected to them from all around, may, by uniting in a small space, form a sufficiently rapid and steady flow to resist sudden disturbances, and, by well filling up the aperture, leave no room for counter-currents; also that the foul air spread out in the space above the ceiling, and cooled so as to fall back and rest on the ceiling, may have as little as possible of its base unsupported and ready to fall back through the vents, should an interruption of their flow allow it.

4. Roofs or drainage-slopes may diminish in declivity the lower they descend, as rivers do; because the upper waters have only their unaided weight, while the lower are impelled also by those behind: so that, however small the whole descent, it may always be improved by taking steepness from the lower part, and giving it to the upper. And thus the ceiling surfaces must be steepest at places farthest from a vent, and their slope may diminish toward every outlet, where the foul air stratum has its motion aided by impulsion from that behind it.

And the differences will be these:—

1. Of course they do not need the same materials or strength.

2. All the vent slopes require, for equal lengths, a far greater ascent than any drain-slopes require descent. For while the friction is alike on both, the moving powers are very unequal. Equal quantities (*i.e.* weights) of the two fluids are each impelled by the difference between their own weights and that of the air they displace; or rather, *both* the weights together, that of the displacing and the displaced fluid, are moved by their said difference. Now water being 800 times heavier than pure air, the *difference* between the weights of a descending mass of water and the mass of air it displaces, will be to their sum, as 799 to 801,—that is, 801 lbs. of matter are here moved by a force of 799 lbs. But supposing the difference of temperature between the pure and foul air to be 20° (which it will hardly equal in hot weather), their difference of weight will be about $\frac{1}{24}$ of either, or $\frac{1}{48}$ of their sum;—so that, here, 48 lbs. of matter are moved by a force of 1 lb. Thus while the breath rises in hot weather (76°), with a buoyancy only equalling [illegible] of its weight in vacuo, the water runs down with a force of $\frac{799}{801}$ of its weight in vacuo. Whence, whatever descent is needed in a yard of smooth paving that it may well and speedily clear itself of water, forty-eight times that rise *at least* will be needed by every yard of equally smooth ceiling to conduct off the foul air to the nearest vent. So, remembering how far more essential *speed* of removal is in this case than the other, I think we may make it a rule for no ceiling-slope to average a lower gradient than 1 to 1, from its lowest point to the outlet.

3. Though the shape and size of drains be important throughout their length, those of the foul-air passages are quite unimportant after it once leaves the ceiling, because there is nothing here analogous to the viscidity and deposits of sewage.

4. Though drains must have a descent all

* See page [illegible], in present number.

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